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## **Canada**

### **Biotechnology - GE Plants and Animals**

#### **Agricultural Biotechnology Annual Report**

**Approved By:**

Robin Tilsworth

**Prepared By:**

Jessica Martin,  
Robin Gray

**Report Highlights:**

Canadian planting of biotech crops is forecast at about 7.2 million hectares in 2010, up from an estimated 6.6 million hectares in 2009. The main biotech crops remain canola, corn, soybeans, and, most recently a small amount of sugar beets. In the past year three new events have been approved for corn and soybeans. Canada remains one of a handful of countries which has approved stacked traits, or planting up to three traits in one crop. On the animal side, guidance from the three regulatory agencies in Canada may be issued within the next year on the issue of whether the offspring or products of clones fall under Canada's novel food act. Meanwhile, EnviroPig, the transgenic pig with reduced phosphorus waste production, cleared the first of several regulatory hurdles when the Canadian Environmental Protection Agency in February 2010 approved reproduction of the animal in confined conditions. Canadian flax exports continue to face difficulties in Europe after trace amounts of a biotech variety were found in shipments.

## Table of Contents

	<b>Page</b>
<b>Section I. Executive Summary</b>	3
<b>Section II. Plant Biotechnology Trade and Production</b>	
A. Biotech Production	3
Table 1: Estimated Seeded Area of Biotech Crops	4
B. Biotech Trade	5
<b>Section III. Plant Biotechnology Policy</b>	
A. Canada's Regulatory System	5
Table 2. Regulating Agencies and Relevant Legislation	7
Table 3: Agencies' Responsibilities	8
Table 4. 2009 Field Trials Breeding Objectives	9
Table 5: Plants with Novel Traits Currently Pending Approval	11
Table 6: Recently Approved Plants with Novel Traits in Canada	13
B. Regulation of Stacked Plant Products in Canada	13
Table 7: Stacked Plant Products Authorized for Unconfined Release in Canada	14
C. Coexistence Between Biotech and Non-Biotech Crops	14
D. Labeling of Genetically Modified Products	15
E. The Cartagena Protocol on Biosafety	16
F. Intellectual Property Rights	17
<b>Section IV. Plant Biotechnology Marketing Issues</b>	
A. Canola	18
B. Flax	18
C. Wheat	19
<b>Section V. Plant Biotech Capacity Building: Not applicable</b>	
<b>Section VI. Animal Biotechnology</b>	
A. Development and Use	20
B. Regulation	21
C. Stakeholder/Public Opinions	22
D. International Organizations	22
<b>Appendix I</b>	
Table 9: All Plants with Novel Traits Approved in Canada	23

## Section I. Executive Summary

Canada was ranked fifth in the world for hectares of land planted with biotech crops according to the International Service for the Acquisition of Agri-biotech Applications in 2009, behind the United States, Brazil, Argentina and India. Actual data on biotech production are limited; although estimates of area planted are available from Statistics Canada and the Canola Council of Canada and suggests 7.2 million hectares in 2010, up from about 6.6 million hectares in 2009. Major Canadian biotech crops remain canola, corn, soybeans and, most recently, sugar beets.

Canada's strong research system and proximity to the United States facilitate collaboration and advances in biotechnology. Canada is one of a handful of countries, along with the United States, Australia, Mexico and South Africa which includes up to three traits in one crop, so that farmers have the option of planting corn seed that is herbicide-tolerant and resistant to two pests; corn borer and corn rootworm.

In August 2011, Monsanto's Roundup Ready soybean trait will be the first widespread plant biotechnology trait to go off patent. The first year Canadian farmers may plant Roundup Ready soybeans saved from their own seed production is 2013. This creates the potential for confusion in the exporting regulatory process. In some countries the approval processes for biotech crops can often take three or four years and may also have a time limit once approval is granted. All these varying timetables could cause complications for Canadian soybean exports.

In September 2009 routine testing indicated trace amounts of a biotech variety, Triffid, in Canadian flax imported into the European Union. Canada supplied about 70 percent of European imports. Canada negotiated a testing and certification protocol but exports have been slow to resume.

On the animal side, guidance from the three regulatory agencies in Canada may be issued within the next year on the issue of whether the offspring or product of clones fall under Canada's novel food act. Meanwhile, EnviroPig, the transgenic pig with reduced phosphorus waste production, cleared the first of several regulatory hurdles in February 2010 when the Canadian Environmental Protection Agency approved reproduction of the animal in confined conditions.

## Section II. Plant Biotechnology Trade and Production

### Biotech Production:

Statistics Canada data combined with information from the Canola Council of Canada provides the best estimate of the level of biotechnology adoption in Canada. The Statistics Canada data provide indications from the annual June farm surveys for corn and soybeans. Comparable data are not available for canola but the Canola Council estimates adoption at about 80 percent of planted area. For sugar beets, little aggregated data is available but with total acreage at less than 20,000 hectares, the amount total area planted to biotech varieties is below 20,000 hectares. The following table combines information from Statistics Canada and the Canola Council to provide an overview of biotech planting in Canada.

**Table 1: Estimated Seeded Area of Biotech Crops**

	Area Seeded ('000 hectares)				Area change 07-10	Area change 09-10
<b>Corn</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>07/10</b>	<b>09/10</b>
Corn	1,392	1,204	1,203	1,206	-13%	0%
Biotech Corn	637	633	743	788	24%	6%
Share Biotech Corn/Total	46%	53%	62%	65%	0%	0%
<b>Soybeans</b>						
Soybeans	1,180	1,211	1,395	1,507	28%	8%
Biotech Soybean	530	605	605	660	25%	9%
Share Biotech Soybeans/Total	45%	50%	43%	44%	0%	0%
<b>Canola</b>						
Canola	5,960	6,399	6,556	7,242	22%	10%
Biotech Canola	4,770	5,790	5,250	5,790	21%	10%
Share Biotech Canola/Total (a)	80%	80%	80%	80%	0%	0%

Source: Statistics Canada

Note: (a) No data available from Statistics Canada, [Canola Council](#) estimates 80 percent of Canadian canola is planted with biotech varieties so figures supplied here are calculated based on Statistics Canada data on total planted area.

## Canola

Most of Canada's canola production is centered in the western provinces of Manitoba, Saskatchewan and Alberta. Total seeded area was hampered by a very wet spring in 2010 so the early forecast of a 10 percent increase in total area may not be accurate. According to the Canola Council of Canada, about 80 percent of total canola area is seeded to biotech varieties. That would put 2009 biotech acreage at about 5.25 million hectares with a boost to 5.79 million hectares planned in 2010. Roughly calculated canola oil accounts for 70 percent of the vegetable oil consumed by Canadians, but that requires only about 25 percent of Canadian canola crop. This means nearly 75 percent of Canadian canola seed, oil and meal are exported to destinations such as the United States, Japan, Mexico, and China.

## Corn

Biotech corn plantings have been steadily increasing, and biotech corn currently accounts for 65 percent of all corn planted in Canada, an increase from 62 percent in 2009. Quebec and Ontario are the primary corn-growing regions, accounting for 90 percent of Canadian corn acreage. In these two provinces the adoption of biotech varieties in 2010 totaled 262 THT for Quebec and 526 THT for Ontario, a slight decrease for Quebec, but increase for Ontario (2009 recorded 267 THT in Quebec, 475 THT in Ontario). Quebec has 39 percent of their total crop as biotech, and in Ontario 38 percent of total corn planted is biotech.

## **Soybeans**

Quebec and Ontario are also the primary soybean growing regions in Canada, accounting for 92 percent of soybean acreage in Canada in 2010. Biotech soybeans increased on a national scale from 605 thousand hectares (THT) in 2009 to 660 THT in 2010, a 9.2 percent increase, and 25 percent increase from 2007 to 2010. In 2009 Manitoba increased their seeded area to 235 THT from 168 THT in 2008 but recorded no planting of biotech varieties. As a consequence the national statistics show total area planted with biotech varieties remained stable while the proportion of the total crop planted in biotech varieties declined.

## **Sugar Beets**

The first herbicide tolerant sugar beets were approved in the United States, Australia, Canada, and the Philippines in 2005. In 2009, after four years of trial fields, biotech sugar beets were planted in Taber, Alberta, by the sugar company Lantic Inc. Alberta has had the largest share of the country's sugar beet area since 1951, and the Census of Agriculture in 2006 reported that almost 80 percent of Canadian sugar beet production is near Taber, where Canada's only sugar beet processing plant is located.

Alberta's distance from ports has been a factor in the success of its sugar beet industry. It is not reported how much of the 12.1 THT of sugar beets seeded in 2009 were biotech varieties.

## **Biotech Trade:**

Canada is an importer of biotechnology crops and products, including grains and oilseeds such as corn and soybeans. Industries such as ethanol production and the livestock feed industry import United States corn and soybeans. In marketing year 2008/2009 Canada imported 1.86 million metric tons (MMT) of corn, 1.18 MMT of soybean meal and 387,000 MT of soybeans from the United States. Most corn and soybeans grown in United States are biotech, so a majority of Canada imports are biotech as well. Canada also imports biotech papaya from Hawaii.

## **Section III. Plant Biotechnology Policy**

### **Canada's Regulatory System**

Canada has an extensive science-based regulatory framework used in the approval process of agricultural products produced through biotechnology. Plants or products that are created with different or new traits from their conventional counterparts are referred to in the Canadian regulatory guidelines and legislation as plants with novel traits (PNTs) or novel foods. Plants with novel traits are defined as:

- A plant variety/genotype possessing characteristics that demonstrate neither familiarity nor substantial equivalence to those present in a distinct, stable population of a cultivated seed in Canada and that have been intentionally selected, created or introduced into a population of that species through a specific genetic change. Plants included under this definition are plants that are produced using recombinant DNA (rDNA) techniques, chemical mutagenesis, cell fusion and conventional cross breeding.

A novel food is defined as:

- A substance, including a microorganism that does not have a history of safe use as a food.
- A food that has been manufactured, prepared, preserved or packaged by a process that has not been previously applied to that food, and causes the food to undergo a major change.
- A food that is derived from a plant, animal or microorganism that has been genetically modified such that the plant, animal or microorganism exhibits characteristics that were not previously observed in that plant, animal or microorganism; the plant, animal or microorganism no longer exhibits characteristics that were previously observed in that plant, animal or microorganism; or one or more characteristics of the plant, animal or microorganism no longer fall within the anticipated range for that plant, animal or microorganism.

The Canadian Food Inspection Agency (CFIA), Health Canada (HC) and Environment Canada (EC) are the three agencies responsible for the regulation and approval of products derived from biotechnology. The three agencies work together to monitor development of plants with novel traits, novel foods and all plants or products with new characteristics not previously used in agriculture and food production.

The CFIA is responsible for regulating the importation, environmental release, variety registration, and the use in livestock feeds of PNTs. Health Canada is responsible for assessing the human health safety of foods, including novel foods, and approving their use in commerce. Environment Canada is responsible for administering the New Substances Notification Regulations and for performing environmental risk assessments of Canadian Environmental Protection Act (CEPA) toxic substance, including organisms and microorganisms that may have been derived through biotechnology.

Fisheries and Oceans Canada is developing regulations for aquatic organisms that are derived through biotechnology. No timeline as to when these regulations will be published has been given and in the meantime any request to develop fish using modern biotechnology for commercial purposes would be subject to the New Substances Notification Regulations under CEPA, 1999.

Provincial governments support the leadership role played by the federal government in regulating agricultural products of biotechnology. There are ongoing consultations between federal and provincial governments (e.g. the 1995 Federal/Provincial workshop on the Regulation of Agricultural Products of Biotechnology) to discuss the regulation of agricultural products of biotechnology.

**Table 2. Regulating Agencies and Relevant Legislation**

Department/Agency	Products Regulated	Relevant Legislation	Regulations
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Canadian Food Inspection Agency	Plants and seeds, including those with novel traits, Animals, Animals vaccines and biologics, Fertilizers, Livestock feeds	<i>Consumer Packaging and Labeling Act, Feeds Act, Fertilizer Act, Food and Drugs Act, Health of Animals Act, Seeds Act, Plant Protection Act</i>	<i>Feeds Regulations, Fertilizer Regulations, Health of Animals Regulations, Food and Drug Regulations</i>
Environment Canada	Biotechnology products under CEPA, such as microorganisms used in bioremediation, Waste disposal, mineral leaching or enhanced oil recovery	<i>Canadian Environmental Protection Act (CEPA)</i>	<i>New Substances Notification Regulations</i>  (These regulations apply to products not regulated under other federal legislation)
Health Canada	Foods, Drugs, Cosmetics, Medical devices, Pest control products	<i>Food and Drugs Act, Canadian Environmental Protection Act, Pest Control Products Act</i>	<i>Cosmetics Regulations, Food and Drug Regulations, Novel Foods Regulations, Medical Devices Regulations, New Substances Notification Regulations, Pest Control Products Regulation</i>
Fisheries and Oceans Canada	Potential environmental release of transgenic aquatic organisms	<i>Fisheries Act</i>	Under development

Sources: Health Canada, Environment Canada, Canadian Food Inspection Agency, Fisheries and Oceans Canada

**Table 3: Agencies' Responsibilities**

Category	CFIA	Health Canada	Environment Canada
<b>Human Health &amp; Food Safety</b>			
Approval of novel foods		X	
Allergens		X	
Nutritional content		X	
Potential presence of toxins		X	
<b>Food Labeling Policies</b>			
Nutritional content		X	
Allergens		X	
Special dietary needs		X	
Fraud and consumer protection	X		
<b>Safety Assessments</b>			
Fertilizers	X		
Seeds	X		
Plants	X		
Animals	X		
Animal vaccines	X		
Animal feeds	X		
<b>Testing Standards</b>			
Guidelines for Testing Effects on Environment			X

Sources: Health Canada, Environment Canada, Canadian Food Inspection Agency, Fisheries and Oceans Canada

Plants with novel traits are subjected to examination under Canada's regulatory process. The steps are:

- Scientists working with genetically modified organisms, including the development of PNTs, adhere to Canadian Institute for Health Research directives, as well as the codes of practice of their own institutional biosafety committees. These guidelines protect the health and safety of laboratory staff and ensure environmental containment.
- The CFIA monitors all PNT field trials to comply with guidelines for environmental safety and to ensure confinement, so that the transfer of pollen to neighboring fields does not occur.
- The CFIA scrutinizes the transportation of seed to and from trial sites as well as the movement of all harvested plant material. The CFIA also strictly controls the importation of all seeds, living plants and plant parts, which includes plants containing novel traits.

In 2009, Canada had 157 submissions and 818 field trials of various crops from numerous companies. Of the 420 field trials conducted in 2008, 365 (87percent) of them involved plants with "stacked" traits.

#### Table 4. 2009 Field Trials Breeding Objectives

Data includes only trials that were both authorized and planted (trials terminated early are also included).



Breeding Objective	Alfalfa	Camelina	Canola	Corn	Cuphea Hybrid
Genetic Research	1	0	0	0	0
Select Marker	1	0	99	0	0
Fertility Restoration	0	0	6	0	0
Male Sterility	0	0	8	0	0
Herbicide Tolerance	4	4	558	25	0
Insect Resistance	0	0	0	4	0
Yield Increase	0	20	214	0	0
Modified Oil Composition	0	0	7	0	0
Nutritional Change	0	0	1	0	0
Stress Tolerance	0	0	385	1	0
<b>Total Trials</b>	<b>3</b>	<b>20</b>	<b>661</b>	<b>15</b>	<b>1</b>

Breeding Objective	Ethiopian Mustard	Poplar	Soybeans	Tobacco
Genetic Research	0	2	1	0
Select Marker	1	2	0	1
Fertility Restoration	0	0	0	0
Male Sterility	0	0	0	0
Herbicide Tolerance	0	0	86	0
Insect Resistance	0	0	0	0
Yield Increase	0	0	74	0
Modified Oil Composition	1	0	31	0
Nutritional Change	0	0	0	0
Stress Tolerance	0	0	0	0
<b>Total Trials</b>	<b>1</b>	<b>2</b>	<b>114</b>	<b>1</b>

Source: [Canadian Food Inspection Agency](#)

- Before any PNT is permitted to be grown outside of confined trials, CFIA must complete an environmental safety assessment focusing on:
- Potential for movement of the novel trait to related plant species
- Impact on non-target organisms (including insects, birds and mammals)
- Impact on biodiversity
- Potential for weed infestations arising from the introduced trait(s)
- Potential for the novel plant to become a plant pest
- The CFIA evaluates all livestock feeds for safety and efficacy, including nutritional value, toxicity and stability. Data submitted for novel feeds include a description of the organism and genetic modification, intended use, environmental fate and potential for the gene (or metabolic) products to reach the human food chain. Safety aspects cover the animal eating the feed, consumption of the animal product by humans, worker safety and any environmental impacts related to use of the feed.
- Health Canada is responsible for assessing food with no previous history of safe use or food that is manufactured by a new process that causes a significant change in composition or is derived

from an organism genetically modified to possess novel trait(s). Health Canada developed the Guidelines for the Safety Assessment of Novel Foods, Volumes I and II, in consultation with experts from the international community, including the Food and Agriculture Organization (FAO), the World Health Organization (WHO) and the Organization for Economic Co-operation and Development (OECD). Using the Guidelines for the Safety Assessment of Novel Foods, Health Canada examines:

- How the food crop was developed, including molecular biological data
- Composition of the novel food, compared to non-modified counterparts
- Nutritional data for the novel food, compared to non-modified counterparts
- Potential for new toxins
- Potential for causing any allergic reaction
- Dietary exposure by the average consumer and population sub-groups (such as children)
- Canada's system of registration for newly developed crop varieties ensures that only varieties with proven benefits to producers and consumers are sold. Once approved for use in field trials, varieties are evaluated in regional field trials. Plant varieties produced through biotechnology cannot be registered and sold in Canada until authorized for environmental, livestock feed and food safety.
- Once environmental, feed and food safety authorizations are granted, the PNT and feed and food products derived from it can enter the marketplace, but are still subject to the same regulatory scrutiny that applies to all conventional products in Canada. In addition, any new information arising about the safety of a PNT or its food products must be reported to government regulators who, upon further investigation, may amend or revoke authorization and/or immediately remove the product(s) from the marketplace.

From development to the time the product has been approved for human consumption can take anywhere between seven to ten years. In some instances the process takes longer than 10 years. In order to maintain the integrity of Canada's regulatory system, several advisory committees have been established to monitor and advise the government of current and future regulatory needs. The Canadian Biotechnology Advisory Committee (CBAC) was established in 1999 to advise the government on ethical, social, scientific, economic, regulatory, environmental and health aspects. The mandate of the Canadian Biotechnology Advisory Committee (CBAC) ended on May 17, 2007. The government replaced the CBAC with the [Science, Technology and Innovation Council](#), as part of a broader effort to consolidate external advisory committees and strengthen the role of independent expert advisors. The Council is an advisory body that provides the Government of Canada with external policy advice on science and technology issues, and it produces regular national reports that measure Canada's science and technology performance against international standards of excellence.

In May, 2009, the Science, Technology and Innovation Council released its first public report, entitled [State of The Nation 2008 - Canada's Science, Technology and Innovation System](#), which benchmarks Canada's science, technology and innovation system against the world's innovating countries. No update has been issued in the last year. CFIA, in the fall of 2006, began consultations regarding a proposal to facilitate the modernization of the seed regulatory framework, specifically addressing the Variety Registration System with the possible creation of a lower cost variety registration option. In late June 2008, CFIA published its proposed regulatory amendments in the Canada Gazette (Part 1). The 75-day consultation period on these proposed amendments is now closed and the feedback is being reviewed. A copy of these proposed amendments are available on the following website: [Proposed Regulatory](#)

Amendments to increase the flexibility of the Variety Registration System.

While CFIA has made it clear that the proposed change in no way changes the safety assessment of novel genetically modified crops, it does have potential to allow for a quicker registration. In short, what the CFIA is proposing is a system that would divide the list of all crops that require variety registration into three parts with three levels of variety registration requirements. For all parts, basic variety registration information would continue to be required, including information demonstrating conformity with minimum health and safety standards, information confirming the identity of new varieties, information supporting the verification of claims, and information required for seed certification purposes. However, the three parts would each have different pre-registration testing (field trials and laboratory testing) and merit assessment requirements. At this time, all crops that require variety registration follow the same pathway. Updates on consultations taking place are available at the following web address: [Seed Consultations](#).

**Table 5: Plants with Novel Traits Currently Pending Approval**

Product for Submission	Developer	Comment Deadline
<a href="#">Soybean FG72 which has been genetically modified for tolerance to glyphosate and HPPD inhibitor herbicides.</a>	MS Technologies LLC and Bayer CropScience Inc.	5/22/2010
<a href="#">Corn (DAS-40278-9) which has been genetically</a>	Dow AgroSciences	3/26/2010

<a href="#">modified for herbicide tolerance</a>	Canada Inc.	
<a href="#">Soybean (MON 87705) which has been genetically modified for oil with enhanced stability and nutrition and herbicide tolerance</a>	Monsanto Canada Inc.	3/26/2010
Soybean (MON 87769) which has been genetically modified to produce an omega-3 fatty acid	Monsanto Canada Inc.	11/17/2009
Soybean (MON 87701) which has been genetically modified for insect resistance	Monsanto Canada Inc.	10/16/2009
<a href="#">Soybean (CV 127) which has been genetically modified for imidazolinone herbicide tolerance</a>	BASF Canada Inc.	7/9/2009
<a href="#">Cotton (T304-40 x GHB119) which has been genetically engineered for lepidopteran insect resistance and glufosinate-ammonium herbicide tolerance</a>	Bayer CropScience Inc.	6/29/2009
<a href="#">Corn (MON 87460) which has been genetically modified for drought tolerance</a>	Monsanto Canada Inc.	5/22/2009
<a href="#">Helianthus annuus, which has been developed for herbicide tolerance using mutagenesis and conventional breeding</a>	BASF Canada Inc.	4/18/2009

Source: [Canadian Food Inspection Agency](#)

Since Post's last annual biotechnology report, three biotech crops have received approval from the Plant Biosafety Office of the Plant Health and Biosecurity Directorate and Animal Feed Division of the Animal Health Directorate; these crops can be released into the environment and used as livestock feed. The time between when a PNT is granted regulatory approval by the CFIA and Health Canada for commercial release and when a PNT is introduced into the market depends on commercial considerations.

**Table 6: Recently Approved Plants with Novel Traits in Canada**

Event	Applicant	Date of Approval	Novel Traits
<a href="#">Corn event MIR162</a>	Syngenta Seeds Canada Inc	11-Feb-10	Resistance to lepidopteran pests
<a href="#">Corn event 98140</a>	Pioneer Hi-Bred Production Ltd	26-Aug-09	Tolerance to glyphosate herbicide and tolerance to ALS-inhibiting herbicides.

<a href="#">Soybean event 356043</a>	Pioneer Hi-Bred Production Ltd	26-Aug-09	Tolerance to glyphosate herbicide and tolerance to ALS-inhibiting herbicides
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Source: [Canadian Food Inspection Agency](#)

## Regulation of Stacked Plant Products in Canada

Similarly to these new varieties, many stacked products, defined in Canada as plant lines developed by conventional crossing of two or more authorized PNTs, do not require further assessment of their environmental safety. Developers of plants with stacked traits, which were created from previously authorized PNTs, are required to notify the CFIA's Plant Biosafety Office (PBO) at least 60 days prior to the anticipated date of the environmental release of these plants. Following notification, the PBO may issue a letter (within 60 days of notification) informing the developer of any concerns it may have regarding the proposed unconfined environmental release. The PBO may also request and review data to support the safe use of the modified plant in the environment. Stacking of traits with potential incompatible management requirements, possible negative synergistic effects, or where production of the plant may be extended to a new area of the country, may require an environmental safety assessment. Until all environmental safety concerns have been resolved, the modified plant should not be released in the environment. However, as a precaution, the PBO requires notification of all stacked products before they are introduced into the marketplace. These notifications are required so that regulators may determine if:

- Any conditions of authorization placed on the parental PNTs are compatible and appropriate for the stacked plant produce
- Additional information is required to assess the safety of the stacked plant product

Additional information and further assessment will be required if:

- The conditions of authorization of the parental PNTs would not apply to the stack (for example, a product developed is applying for alterations to stewardship requirements, or the conditions described in the stewardship plans of parental PNTs are no longer effective for the stack)
- The novel traits of the parental PNTs are expressed differently in the stacked plant product (e.g. greater or lower expression)
- The stacked product expresses an additional novel trait

**Table 7: Stacked Plant Products Authorized for Unconfined Release in Canada**

Crop	Name of the Authorized Stacked Product	Stacked Traits	Date of Authorization
Corn	MON810 x NK603	Insect Resistance; Herbicide	06-11-2001
Corn	MON810 x MON863 x MK603	Insect resistance; Herbicide tolerance	06-17-2004
Corn	Bt11 x GA 21	Insect resistance; Herbicide tolerance	05-06-2005

Corn	DAS 59122 x NK 603	Insect resistance; Herbicide tolerance	12-06-2005
Corn	DAS-01507 x DAS59122 x NK603	Insect resistance; Herbicide tolerance	01-19-2006
Corn	DAS-01507 x FAS-59122-7	Insect resistance; Herbicide tolerance	01-19-2006
Corn	MON810 x MON88017	Insect resistance; Herbicide tolerance	03-01-2006
Corn	MIR 604 x Bt11	Insect Resistance	08-16-2007
Corn	MIR 604 x Bt11 x GA21	Insect resistance; Herbicide tolerance	08-16-2007
Corn	MON 89034 x DAS1507 x MON88017 x DAS59122	Insect resistance; Herbicide tolerance	07-17-2009 This product was authorized with new stewardship rqmts.
Wheat	ALS1 x ALS2 ALS1 (DD1999-31; DD2007-66) ALS2 (DD2003-44; DD2004-47; DD2006-60; DD2004-48; DD2006-63)	Herbicide Tolerance	05-25-2007
Wheat	ALS1 x ALS3 ALS1 (DD1999-31; DD2007-66) ALS3 (DD2007-64)	Herbicide Tolerance	05-29-2007

Source: [Canadian Food Inspection Agency](#)

### Coexistence Between Biotech and Non-Biotech Crops

In Canada, the coexistence between biotechnology and non-biotechnology crops is not regulated by the government, but rather the onus is on the producers. For example, if producers of organic crops wish to avoid biotech events in their production systems the onus for implementing measures to facilitate this falls on them. In return, those producers are able to charge a premium price for their product, for incurring costs associated with meeting the requirements of their customers and certification bodies.

Biotech stewardship conditions applies to biotech crops in Canada, with some companies providing biotech crop farmers with coexistence recommendations for minimizing the chances of adventitious presence of biotech crop material being found in non-biotech crops of the same species. In addition, producers of biotech crops are provided with weed management practice guides. These changes in management practices may help to improve the coexistence between biotech and non-biotech crops, without the need to introduce government regulations. For example, Croplife Canada has developed the Stewardshipfirst™ initiatives in order to manage the health, safety and environmental sustainability of the industry's products throughout their life cycle. Stewardshipfirst™ includes Best Management Practices Guide for growers of Biotech crops.

Despite the fact that the government does not regulate the coexistence between biotech and non-biotech crops, the presence and increasing trend toward biotech crops has not hindered the organic industry.

The growth or lack thereof in the organic industry is based on demand by consumers, rather than the presence or absence of biotech crops. There have been disputes between the biotech community and the organic community due to adventitious presence of biotech crops (for example canola) in organic crops, but the lack of complete information indicating the actual levels of the biotech crops in organic crops, the frequency of testing of organic crops, location of crops relative to biotech crops, the origin of seed, measures taken to minimize adventitious presence occurring, means that it is not possible to fully assess whether there have been or may be coexistence problems between organic and biotech crops in Canada.

## **Labeling of Genetically Modified Products**

In 2004, the Standards Council of Canada adopted the Standard for Voluntary Labeling and Advertising of Foods that Are and Are Not Products of Genetic Engineering, as a National Standard of Canada. The development of the voluntary standards was carried out by multi-stakeholder committee, facilitated by the Canadian General Standards Board (CGSB), at the request of the Canadian Council of Grocery Distributors, and began in November 1999. The committee was made up of 53 voting members and 75 non-voting members from producers, manufacturers, distributors, consumers, general interest groups and six federal government departments, including Agriculture and Agri-Food, Health Canada and the CFIA.

Health Canada and the CFIA are responsible for all federal food labeling policies under the Food and Drugs Act. Health Canada is responsible for setting food labeling policies with regards to health and safety matters, while the CFIA is responsible for development of non-health and safety food labeling regulations and policies. It is the CFIA's responsibility to protect consumers from misrepresentation and fraud with respect to food labeling, packaging and advertising, and for prescribing basic food labeling and advertising requirements applicable to all foods.

The Standard for Voluntary Labeling and Advertising of Foods that Are and Are Not Products of Genetic Engineering, was developed to provide customers with consistent information for making informed food choices while providing labeling and advertising guidance for food companies, manufacturers and importers. The definition of genetically engineered food provided by the Standard are those foods obtained through the use of specific techniques that allow the moving of genes from one species to another. The regulations outlined in the Standard are:

- The labeling of food and advertising claims pertaining to the use or non-use of genetic engineering are permissible as long as the claims are truthful, not misleading, not deceptive, not likely to create an erroneous impression of a food's character, value, composition, merit or safety, and in compliance with all other regulatory requirements set out in the Food and Drugs Act, the Food and Drugs Regulations, the Consumer Packaging and Labeling Act and Consumer Packaging and Labeling Regulations, the Competition Act and any other relevant legislation, as well as the Guide to Food Labeling and Advertising.
- The Standard does not imply the existence of health or safety concerns for products within its scope.
- When a labeling claim is made, the level of accidental co-mingling of genetically engineered and non-genetically engineered food is less than 5 percent.
- The Standard applies to the voluntary labeling and advertising of food in order to distinguish



whether or not such foods are products of genetic engineering or contain or do not contain ingredients that are products of genetic engineering, irrespective of whether the food or ingredient contains DNA or protein.

- The Standard defines terms, and sets out criteria for claims and for their evaluation and verification.
- The Standard applies to food sold to consumers in Canada, regardless of whether it is produced domestically or imported.
- The Standard applies to the labeling and advertising of food sold prepackaged or in bulk, as well as to food prepared at the point of sale.
- The Standard does not preclude, override, or in any way change legally required information, claims or labeling, or any other applicable legal requirements.
- The Standard does not apply to processing aids, enzymes used in small quantities, substrates for microorganisms, veterinary biologics and animal feeds.

The push from some groups in Canada for mandatory labeling of genetically engineered food continues despite the creation and implementation of the Standard. Over the past few years several private members' bills have been introduced into the House of Commons seeking to require the mandatory labeling of foods containing biotech components, although none have made it past second reading.

### **The Cartagena Protocol on Biosafety**

In 2001, Canada signed onto the Cartagena Protocol, but has yet to ratify it. There is tremendous opposition from many farm groups, like the Canadian Canola Council, the Grain Growers of Canada, Viterra and many others, to the ratification of the Protocol. There are also those groups like the National Farmers Union and Greenpeace, which are pushing the government to ratify it. To determine the best course of action in regards to the Protocol, the Government of Canada has been consulting with stakeholders. The consultations have resulted in three options on how the government should proceed being put forward:

- Proceed to immediate ratification of the Protocol with the intent to participate as a Party in the first meeting of the Parties; Keep the decision on ratification under active review while continuing to participate in Protocol processes as a non-Party and acting voluntarily in a manner that is consistent with the objective of the Protocol;
- Decide not to ratify the Protocol.

The position the Government of Canada has taken follows along the line of option b and industry sources indicate that this is likely to remain the course for at least the medium term. Canada and Canadian industries rely heavily on imports of United States crops to meet their requirements. Therefore, the ratification of the Cartagena Protocol could become a barrier to trade with the United States.

### **Intellectual Property Rights**

The Patent Act and the Plant Breeders' Rights Act both afford breeders or owners of new varieties the ability to collect technology fees or royalties on their products. The Patent Act grants patents that cover



the gene in the plant or the process used to incorporate the gene, but does not provide a patent on the plant itself. The protection of the plant would be covered by the Plant Breeders' Rights (PBR) Act. The Patent Act enables breeders to sell their product commercially to producers. The cost of the patented product will most likely include technology fees. This enables the breeders to recover the financial investment they have made in developing their product.

The Plant Breeders' Rights (PBR) Act grants plant breeders of new varieties the exclusive rights to produce and sell propagating material of the variety in Canada. The PBR Act outlines that the holder of the plant breeders' rights is able to collect royalties on the product. The PBR Act became law in 1990 and adhered to the terms of the 1978 Union for the Protection of New Varieties of Plants (UPOV) Convention. In 1992, Canada was a signatory to 1991 UPOV Convention. In order to bring the PBR Act into compliance with the new convention, Canada must make amendments to the PBR Act. Consultations involving the Plant Breeders' Rights Office, the Canadian seed industry, representatives from the horticulture and agriculture industries and the Minister's Plant Breeders' Rights Advisory Committee have resulted in the development of amendments which would bring the PBR Act into conformity with 1991 UPOV Convention.

During the next year there are several breeders whose patent protection will expire, for instance, Roundup Ready soybeans patent will expire in August, 2011, the first widespread plant biotechnology with novel traits to go off patent (Monsanto Stakeholder Letter July). However, [Canadian Soybean Exporters Association](#) (CSEA) cited a few factors that decrease the impact of the expirations. First, most soybeans are used for crush (not food), and exported, placing a majority of the change on the seed companies. Second, Monsanto has already developed and begun advertising a second-generation Roundup Ready soybean technology—[Genuity™ Roundup Ready 2 Yield®](#) (RR2), developed in 2009, advertising 7-11% higher yields than Roundup Ready soybeans, and many farmers have begun preparing to make the transition. Third, corn is a much more important market for biotech expiration dates as the consumption is largely domestic, and a majority of biotech corn is devoted to food products. However, corn biotech seeds have a quicker shelf life than soybeans, and farmers are prohibiting from retaining their seeds, which encourages the introduction of new varieties every season to create a constant approval of new corn seeds.

In August 2011, Monsanto's Roundup Ready soybean trait will be the first widespread plant biotechnology trait to go off patent. The first year Canadian farmers may plant Roundup Ready soybeans saved from their own seed production is 2013. This creates the potential for confusion in the exporting regulatory process. In some countries the approval processes for biotech crops can often take three or four years and may also have a time limit, which may be difficult for Canadian soybean exports. There is increased potential for exporting nations to block Canadian imports until the approval is confirmed. However, farmers may choose to take advantage of the farmers' ability to buy certified seed from any company that held a valid license for original Roundup Ready soybeans without any contractual obligations or royalty due Monsanto for the trait, which could balance out the lapse in approval processes.

#### **Section IV. Plant Biotechnology Marketing Issues**

Consumer surveys find public opinion on biotech in agriculture divided. A 2002 Pew Global Attitudes

Project [survey](#) reported that only 37 percent of Canadians viewed scientifically altered fruits and vegetables as good, whereas 63 percent thought these products were bad. A 2006 [Decima](#) Research survey concluded that, although Canadians embrace most types of new technology such as hybrid cars, biofuels and stem cell research, 58 percent of Canadians believed that biotech animals will make life worse over the next twenty years, 54 percent held the same view of biotech fish, and 50 percent believe their future will be negatively impacted by biotech food. Conversely, in a 2008 survey by [BIOTECCanada](#), 79 percent of Canadians agreed that biotechnology would bring benefits to agriculture. Thus, more uniform and long-term surveys must be administered before firm conclusions can be drawn about public opinion.

## Canola

Canola is a “Made in Canada” crop, including its name, which stands for Canadian oil, low erucic acid. The canola industry reports 60,000 canola growers, 13 processing plants in five provinces, 2,800 employees and the industry estimates that canola contributes C\$13 billion annually to the Canadian economy. The [Canola Council of Canada](#) is an industry group that promotes the benefits of consuming canola encourages canola exports.

Biotech canola varieties have been modified to be resistant to specific herbicide. Although the plants are modified, the industry points out that the oil is not, modified, and therefore canola oil is the same whether from modified or conventional canola seed. The Canola Council stresses the health benefits of biotech canola, which is grown on about 80 percent of land planted in canola in Western Canada. In 2008, the Canadian government attempted to increase overall canola supply, as the Agriculture and Agri-Food Canada’s Agri-Marketing announced a \$C3 million dollar program to support the Canola Council of Canada’s (CCC’s) “Growing Great 2015” strategy to increase international demand for canola products.

## Flax

The issue facing Canadian flax producers has never been opposition to biotech flax at home, but in exports of flax to Canada’s largest market, the European Union (EU). In the late 1990's a biotech flax seed, an herbicide tolerant variety, was registered and approved by the CFIA and Health Canada for commercial production and consumption. The variety was registered as Triffid. But consumers in the EU indicated that they would not purchase biotech flax. Canadian flax producers were concerned that they would be unable to keep biotech and non-biotech flax segregated and rather than risking their largest market, Canadian flax producers pushed to have Triffid deregistered and pulled from the market in 2001. However, in September 2009 routine testing indicated trace amounts of the Triffid were found in Canadian flax imported into the EU. Canada supplied about 70 percent of European imports. Canada negotiated a testing and certification protocol but exports have been slow to resume.

**Table 8 Canadian Flax Exports to the European Union (EU)**

Partner Country	Quantity in Metric Tons					
	Oct/Sept 07/08	Oct/Sept 08/09	Percent Change	Oct/May 08/09	Oct/May 09/10	Percent Change

EU	395,917	388,604	-2%	304,976	219,576	-28%
Total	639,240	610,124	-5%	754,350	588,516	-22%

Source: Global Trade Atlas

## Wheat

In 2002, the time when Monsanto was seeking regulatory approval for its Round-up Ready (RR) wheat, the issue of biotech wheat in Canada became very decisive with some producers strongly believing in the benefits of growing RR wheat and supporting its regulatory approval, while other producers feared the approval and commercialization of RR wheat would cost Canadian wheat farmers their international markets. The fear that lack of consumer acceptance of biotech wheat could result in loss of markets for Canadian wheat growers remains the main barrier to Canadian wheat farmers' willingness to embrace biotech wheat. No varieties are in the regulatory approval pipeline.

In May 2009, pro-biotech [wheat groups](#) from the United States, Canada, and Australia announced plans to synchronize commercialization of biotech traits in the wheat, and simultaneously emphasized the importance of wheat to the world food supply and citing declining acreage of wheat in the three countries, which they attributed in part to competition from biotech crops. However, other Canadian wheat groups continue to oppose biotech wheat, including the National Farmers Union, the Canadian Biotechnology Action Network, Union Paysanne and Union Biologique Paysanne.

On April 19, 2010, Ian White, head of the Canadian Wheat Board, made the [statement](#) that more testing of the world's wheat would find biotech traces due to containment from other crops in the grain-handling system. White argued for the acceptance of low-level biotech materials in wheat, but recognized that biotech wheat would likely not become commercialized for a decade.

The Canadian Wheat Board did not sign the pro-biotech wheat petition; will not support genetically modified wheat until the follow conditions are satisfied:

Widespread market acceptance;

- The establishment of achievable tolerance levels;
- The development of an effective segregation system;
- The availability of rapid, accurate and inexpensive detection technology; and
- A positive benefit-cost ratio in the wheat value chain, especially for farmers.

Currently, there is little movement to commercialize biotech wheat in Canada, as Canadian producers are wary after the trade disruption caused by trace amounts of biotech flax. However, when the change does come, many Canadian producers are arguing for cooperation with the United States so that biotech wheat seed can be released throughout North America. Although slowed by more complicated licensing in Canada than the United States as well as contamination worries, biotech wheat could be helped by increasing numbers of niche markets and the growth of the Canadian biofuel industry.

## Section V. Plant Biotechnology Capacity Building and Outreach

Not applicable to Canada.

## Section VI. Animal Biotechnology

### Development and Use:

[EnviroPig](#), the world's first transgenic animal created at the University of Guelph, was created in 1999 with a snippet of mouse DNA introduced into their chromosomes, which causes the pigs to produce reduced phosphorus feces. Enviropigs have been under development for well over 10 years, with the aim that they could one day be sold to commercial hog farmers. However, despite the support from organizations such as Ontario Pork, Enviropig has yet to sign a full commercial partner due to the complicated regulatory hurdles required to approve the meat for human consumption. The university has an application into Health Canada, submitted in 2009, asking the agency to declare the pigs fit for human consumption. Another application to the U.S. Food and Drug Administration is still pending. However, In February 2010, the University of Guelph cleared the first regulatory hurdle when it received approval from the Canadian Environmental Protection Agency to reproduce the animal in confined conditions. The University of Guelph hails this as an important milestone that means that other facilities can now start breeding the pigs for research but cautioned that Enviropig has been patiently waiting for ten years, and will continue to wait until the pig is approved for human consumption. The university has identified both the United States and China as lucrative markets for Enviropig.

[Aqua Bounty Technologies](#), Inc. was incorporated in December 1991 in the state of Delaware. Aqua Bounty Canada, Inc., the Canadian subsidiary, was incorporated in January 1994. In 1996, the company obtained the exclusive licensing rights for a gene construct (transgene) used to create a breed of farm-raised salmon that are expected to exhibit growth rates substantially faster than natural growth rates. The company maintains biotechnology laboratories at St. John's, Newfoundland and San Diego, California, and operates a fish hatchery on a 3.5 acre site on Prince Edward Island. AquaAdvantage Salmon grow faster and reach mature size earlier than standard salmon, but they do not grow to be larger. In addition to salmon, AquaBounty is also developing advanced-hybrid trout, and tilapia designed to grow faster than traditional fish.

[Nexia Biotechnologies](#) changed leadership and expanded in 2006 after an agreement with Enesco Energy Services Corps resulted in the amalgamation of Nexio, Private Enesco and Management Co to form "Enesco Energy Services Corp," a new oil and gas service industry company and the creation of New Nexia which will continue to pursue Nexia's biotechnology opportunities. They will continue to study transgenic biology to transfer specific genes of interest into mice (gene testing) or goats (protein production) through nuclear transfer or microinjection. Once a transgenic fertilized egg is transferred to the foster recipient, a normal pregnancy ensues, and gestation time is approximately 5 months. The kids produced from such a pregnancy may carry the gene of interest and are considered founder animals. If the founder is female, she will produce the (desired) protein in her milk when she lactates. Nexia is also breeding goats that have been genetically modified with spider genes with hopes that their milk will be a plentiful source of the proteins required for spider silk to make strong fibres for commercial application.

In late July 2010, Canada's first cloned bull, born and raised in one of the country's premiere artificial insemination centers was made available to the public. [Starbuck II](#) is on display at the St. Hyacinthe Agricultural Expo, at ten years old weighing in at 1,100 kilograms and standing 6 feet tall at his shoulder. For the first time, the test tube animal is outside the bio-secure facilities at the Artificial

Insemination Centre of Quebec (CIAQ). Three scientific groups (CIAQ, Alliance Bovine and the Veterinary Department of the University de Montreal) took part in the groundbreaking cloning. Two years after the death of Starbuck, Starbuck II came into the world via caesarean section. Starbuck II may be the clone of a prize winning and very profitable stud, but neither his semen nor his flesh can be sold in Canada due to Environment and Health Canada regulations. According to CIAQ at one time there were 13 different cloned bulls in Canada but only two remain. Because of the time it takes to clone and the restrictions on the sale of the byproducts of the process, cloning is no longer a priority for CIAQ.

## **Regulation**

The regulation of animal clones, their offspring and products of clones or offspring currently fall under the Novel Foods provision of Canada's Food and Drug Regulation (Division 28, Part B), the Feeds Regulations and the New Substances Notification Regulations (Organisms). Novel foods are defined as products that have not demonstrated a history of safe use, and have utilized a new method of manufacture that can lead to a significant change in the product from conventional counterparts. However, there remains a question on whether clones and their offspring and/or the products of clones and their offspring equally meet the definition of a novel food. To move towards a final regulatory policy, the three main governmental units with jurisdiction on biotechnology (Health Canada, Environment Canada and Canadian Food Inspection Agency) are reportedly drafting a scientific opinion paper meant to lay out the framework for the Government of Canada to then move forward on regulating clones, their progeny and product determining whether these animals, their progeny and/or their products meet the definition of novel foods.

The Animal biotechnology sector, despite new and specific regulations, is subject to the same rigorous health and safety regulations that apply to conventional animals and their derived products. As with conventional animals and their derived products, these regulatory controls include the Health of Animals Act and Regulations, the Food and Drugs Act and Regulations, the Meat Inspection Act and Regulations and the Feeds Act and Regulations which are administered by the Canadian Food Inspection Agency (CFIA).

## **Stakeholder/Public Opinions**

As with crops developed through biotechnology, Canadian regulators will most likely leave the ethical, social and religious issues of genetically engineered animals to the marketplace. As there are currently no animals produced from biotechnology that have entered commercial channels in Canada, it is difficult at this time to accurately gauge what market acceptance may be. The general feeling from industry stakeholders involved in animal biotechnology is that given the generally strong market acceptance in Canada of biotechnology in crops and crops by-products, the same may hold true for animals produced with biotechnology. There will be those who embrace the benefits that are offered by biotechnology and those who will reject it. While definitive guidelines with regards to animals and fish produced through biotechnology have not been released yet, it is unlikely that Canada will require meats, or other products produced by genetically engineered animals to be labeled as such. As a result, Canadian consumers may not be in a position to make value judgments. Of note, the developers of the Enviropig hold the position that they would like the meat produced from their more environmentally friendly pig to be identified as having come from an Enviropig.

## International Organizations

While Canada does attend international forums where agricultural biotechnology may be discussed (CODEX, OIE), Canada refrains from taking an official position as there is currently no definitive, comprehensive Canadian position with regards to the regulation of animal biotechnology.

## Appendix I

**Table 9: All Plants with Novel Traits Approved in Canada**

Crop	Designation/ Event(s)	Applicant(s)	Trait	Reviewed Uses Within Canada
Canola	(B. rapa) HCR-1	AgrEvo Canada Inc. (currently Bayer CropScience)	Glufosinate ammonium tolerance	Environment, feed
Canola	(B. rapa) ZSR500, ZSR502, ZSR503	Monsanto Canada Inc.	Glyphosate tolerance	Environment, feed
Canola	Canol B. juncea	BASF Canada	Imidazolinone tolerance; non-LMO	Environment, feed, food
Canola	23-198, 23-18-17	Calgene Inc. (currently Monsanto Canada Inc.)	Higher quantities of laurate and myristate	Environment, feed, food
Canola	45A37, 46A40	Pioneer Hi-Bred International Inc.	High oleic / low linolenic acid	Food
Canola	GT200 (RT200)	Monsanto Canada	Glyphosate	Environment,



		Inc.	tolerance	feed, food
Canola	GT73 (RT73)	Monsanto Canada Inc.	Glyphosate tolerance	Environment, feed, food
Canola	HCN28 (T45)	AgrEvo Canada Inc. (currently Bayer CropScience)	Glufosinate ammonium tolerance	Environment, feed, food
Canola	HCN92	AgrEvo Canada Inc. (currently Bayer CropScience)	Glufosinate ammonium tolerance	Environment, feed, food
Canola	MS1, RF1, RF2 (MS1xRF1, MS1xRF2)	Plant Genetic Systems (currently Bayer CropScience)	Male sterility / fertility restoration / glufosinate ammonium tolerance	Environment, feed, food
Canola	MS8, RF3 (MS8xRF3)	Plant Genetic Systems (currently Bayer CropScience)	Male sterility / fertility restoration / glufosinate ammonium tolerance	Environment, feed, food

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Table 9, continued

**All Plants with Novel Traits Approved in Canada**

Canola	NS738, NS1471, NS1473	Pioneer Hi-Bred International Inc.	Imidazolinone tolerance	Environment, feed, food
Corn	375IR	Pioneer Hi-Bred International Inc.	Imidazolinone tolerance	Environment, feed, food
Corn	Cornline 1507	Dow AgroSciences Canada Inc. and Pioneer Hi-Bred International Inc.	Lepidopteran resistance / glufosinate - ammonium tolerance	Environment, feed, food
Corn	Cornline 603	Monsanto Canada Inc.	Glyphosate tolerance	Environment, feed, food
Corn	DBT418	Dekalb Genetics Corporation (currently Monsanto Canada Inc.)	European Corn Borer resistance/ glufosinate ammonium tolerance	Environment, feed, food
Corn	DK404SR	BASF Canada Inc.	Sethoxydim tolerance	Environment, feed, food
Corn	DLL25	Dekalb Genetics Corporation	Glufosinate ammonium	Environment, feed, food

		(currently Monsanto Canada Inc.)	tolerance	
Corn	Event 176	Ciba-Geigy Corporation, Ciba Seeds (currently Syngenta Seeds) and Mycogen Corporation	European Corn Borer resistance	Environment, feed, food
Corn	Event 3272	Syngenta Seeds Canada Inc.	Expression of a thermostable alpha amylase enzyme	Environment, feed, food
Corn	Event Bt11 (4334 CBR 4374 CBR)	Northrup King Ltd. (currently Syngenta Seeds)	European Corn Borer resistance	Environment, feed, food
Corn	Event DAS-06275-8	Dow AgroSciences Canada Inc.	Lepidopteran resistance / glufosinate - ammonium tolerance	Environment, feed, food

Table continued on next pages.

Table 9, continued

**All Plants with Novel Traits Approved in Canada**

Corn	Event LY038	Monsanto Canada Inc.	Increased level of free lysine	Environment, feed, food
Corn	Event MIR604	Syngenta Seeds Canada Inc.	Western and Northern Corn Rootworms resistance	Environment, feed, food
Corn	EXP1910IT	ICI / Zeneca Seeds (currently Advanta Seeds)	Imidazolinone tolerance	Environment, feed, food
Corn	GA21	Monsanto Canada Inc.	Glyphosate tolerance	Environment, feed, food
Corn	Liberty Link™ lines: T14, T25	AgrEvo Canada Inc. (currently Bayer CropScience)	Glufosinate ammonium tolerance	Environment, feed, food
Corn	Line 59122	Dow AgroSciences Canada Inc. and Pioneer Hi-Bred Production Inc.	Western and Northern Corn Rootworms resistance/ Glufosinate-ammonium tolerance	Environment, feed, food



Corn	MON 88017	Monsanto Canada Inc.	Western and Northern Corn Rootworms resistance / Glyphosate tolerance	Environment, feed, food
Corn	MON-89034-3	Monsanto Canada Inc.	Lepidopteran resistance	Environment, feed, food
Corn	MON802	Monsanto Canada Inc.	European Corn Borer resistance / glyphosate tolerance	Environment, feed, food
Corn	MON809	Pioneer Hi-Bred International Inc.	European Corn Borer resistance / glyphosate tolerance	Environment, feed, food
Corn	MON810	Monsanto Canada Inc.	European Corn Borer resistance	Environment, feed, food

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Table 9, continued

**All Plants with Novel Traits Approved in Canada**

Corn	MIR 162	Syngenta Seeds Canada Inc	Resistance to lepidopteran pests	Environment, feed, food
Corn	MON832	Monsanto Canada Inc.	Glyphosate tolerance	Food
Corn	MS3	Plant Genetic Systems (currently Bayer CropScience)	Male sterility / glufosinate ammonium tolerance	Environment, feed, food
Corn	TUSC1	Pioneer Hi-Bred International Inc.	Reduced zein expression	Environment, feed
Cotton	Not assigned	Monsanto Canada Inc.	Bromoxynil tolerance / lepidopteran resistance	Food
Cotton	MON-15985-7	Monsanto Canada Inc.	Lepidopteran resistance	Feed, food
Cotton	531: MON-00531-6; 757: MON-00757-7; 1076: MON-89924-2	Monsanto Canada Inc.	Lepidopteran resistance	Feed, food
Cotton	Not assigned	Calgene Inc. (currently Monsanto)	Bromoxynil tolerance	Feed, food

		Canada Inc.)		
Cotton	DAS-24236-5	Dow AgroSciences Canada Inc.	Lepidopteran resistance	Feed, food
Cotton	DAS-21023-5	Dow AgroSciences Canada Inc.	Lepidopteran resistance	Feed, food
Cotton	BCS-GH002-5	Bayer CropScience	Glyphosate tolerance	Feed, food
Cotton	ACS-GH001-3	Bayer CropScience	Glufosinate ammonium tolerance	Feed, food
Cotton	MON-88913-8	Monsanto Canada Inc.	Glyphosate tolerance	Feed, food
Cotton	1445: MON-01445-2; 1698: MON-89383-1	Monsanto Canada Inc.	Glyphosate tolerance	Feed, food

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Table 9, continued

**All Plants with Novel Traits Approved in Canada**

Flax	FP967 (CDC Triffid)	University of Saskatchewan	Sulfonylurea tolerance	Environment, feed, food
Lentils	RH44	BASF Canada Inc.	Imidazolinone tolerance	Environment, feed, food
Potato	RBMT21-350: NMK- 89185-6; RBMT21- 129: NMK-89684-1	Monsanto Canada Inc.	Colorado Potato Beetle resistance / Potato Leafroll virus resistance	Environment, feed, food
Potato	New Leaf™ Russet Burbank lines: BT06, BT10, BT12, BT16, BT17, BT18, BT23; Superior lines: SPBT02-5, SPBT02- 7	Monsanto Canada Inc.	Colorado Potato Beetle resistance	Environment, feed, food
Potato	New Leaf™ Y lines: RBMT15-101, SEMT15-02, SEMT15-15	Monsanto Canada Inc.	Colorado Potato Beetle resistance / Potato virus Y resistance	Environment, feed, food
Rice	CL121, CL141, CFX51 (derived from 93A33510)	BASF Canada Inc.	Imazethapyr tolerance	Feed, food
Rice	Event LLrice62	Bayer CropScience	Glufosinate ammonium tolerance	Feed, food
Rice	IMINTA 1 and	BASF Canada Inc.	Imidazolinone	Feed, food

	IMINTA 4		tolerance	
Table continued on next pages.				
Table 9, continued				
<b>All Plants with Novel Traits Approved in Canada</b>				
Rice	PWC16	BASF Canada Inc.	Imazethapyr tolerance	Feed, food
Soybeans	Event 305423	Pioneer Hi-Bred Production Ltd.	High oleic / low linoleic and linolenic acids	Environment, feed, food
Soybeans	Delicious Soybean	Monsanto Canada Inc.	Reduced glycinin content	Environment, feed, food
Soybeans	G94-1, G94-19 and G168	Optimum Quality Grains (currently Dupont Canada)	High oleic acid	Environment, feed, food
Soybeans	GTS 40-3-2	Monsanto Canada Inc.	Glyphosate tolerance	Environment, feed, food
Soybeans	MON 89788	Monsanto Canada Inc.	Glyphosate tolerance	Environment, feed, food
Soybeans	356043	Pioneer Hi-Bred Production Ltd	Tolerance to glyphosate herbicide and tolerance to ALS-inhibiting herbicides	Environment, feed, food
Squash	CZW3	Seminis Vegetable Seeds Inc.	Virus resistance	Food
Squash	ZW20	Seminis Vegetable Seeds Inc.	Virus resistance	Food
Sugar Beet	1022S, 1026S, 1031S (derived from Event T120-7)	AgrEvo Canada Inc. (currently Bayer CropScience)	Glufosinate tolerance	Environment, feed, food
Sugar Beet	Line H7-1	Monsanto Canada Inc. and KWS SAAT AG	Glyphosate tolerance	Environment, feed, food
Sunflower	Clearfield™ Oilseed Sunflower Hybrid X81359	BASF Canada Inc.	Imidazolinone tolerance	Environment, feed, food
Sunflower	ExpressSun™ SU7	Pioneer Hi-Bred Production Ltd.	Sulfonylurea tolerance	Environment, feed, food

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Table 9, continued

**All Plants with Novel Traits Approved in Canada**

Tomato	1345-4	DNA Plant Technology	Delayed ripening	Food
Tomato	1401F, h382F, 11013F, 7913F	Zeneca Seeds (currently Advanta Seeds Inc.)	Delayed ripening	Food
Tomato	5345	Monsanto Canada Inc.	Lepidopteran insect resistance	Food
Tomato	Flavr Savr™	Calgene Inc. (currently Monsanto Canada Inc.)	Delayed ripening	Food
Wheat	AP205CL	BASF Canada Inc.	Imidazolinone tolerance	Environment, feed, food
Wheat	AP602CL	BASF Canada Inc.	Imazamox tolerance	Environment, feed, food
Wheat	BW255-2 and BW238-3	BASF Canada Inc.	Imidazolinone tolerance	Environment, feed, food
Wheat	BW7	BASF Canada Inc.	Imidazolinone tolerance	Environment, feed, food
Wheat	Durum (Triticum turgidum L.) event DW1	BASF Canada Inc.	Imidazolinone tolerance	Environment, feed, food
Wheat	Durum (Triticum turgidum L.) events DW2, DW6, and DW12	BASF Canada Inc.	Imidazolinone tolerance	Environment, feed, food
Wheat	SWP 965001	Cyanamid Crop Protection (currently BASF Canada Inc.)	Imidazolinone tolerance	Environment, feed, food
Wheat	Teal 11A	BASF Canada Inc.	Imidazolinone tolerance	Environment, feed, food

Source: [Canadian Food Inspection Agency](#)